

January 23, 2009
Job No. 0866-001-09

JRCA Architects
577 South 200 East
Salt Lake City, Utah 84111

Attention: Mr. Gordon Clark

Gentlemen:

Re: Report
Geotechnical Study Update
Proposed Brine Shrimp Facilities
Ogden Bay Wildlife Management Area
Approximately 4600 South and 7400 West
West of Hooper, Utah

1. INTRODUCTION

This report presents the results of our geotechnical study update performed at the site of the proposed brine shrimp facilities at the Ogden Bay Wildlife Management Area west of Hooper, Utah. A geotechnical report was previously completed by Mr. Mike Huber Gordon Spilker Huber Geotechnical Consultants, Inc. (GSH) while working for AMEC Earth & Environmental, Inc. The results of this report are presented in a report dated July 3, 2002¹. GSH recently performed a percolation test and soil exploration update for the site and the results are presented in a letter dated July 10, 2008².

Due to the time that has elapsed since the completion of this report, it has been requested that an update to the report be completed. Mr. Huber has visited the site various times over the last few months and the existing ground surface appears to have been unchanged since the initial study was completed for the July 3, 2002 report. It is also our understanding that the proposed construction presented in the July 3, 2002 report has not been significantly modified. Therefore,

¹ "Report, Geotechnical Study, Proposed Brine Shrimp Facilities, Ogden Bay Wildlife Management Area, Approximately 4600 South and 7500 West, West of Hooper, Utah," AMEC Earth & Environmental, Inc. Job No. 2-817-004015.

² "Summary Letter, Percolation Test and Soil Exploration Update, Proposed Brine Shrimp Facilities, Ogden Bay Wildlife Management Area, Approximately 4600 South and 7400 West, West of Hooper, Utah," GSH Job No. 0765-001-08.

the recommendations presented in the July 3, 2002 report are valid for the site. The geoseismic aspects and groundwater measurements have been updated in the following sections.

2. GROUNDWATER

To facilitate monitoring future groundwater fluctuations, prior to backfilling Borings B-1 and B-2, slotted PVC pipe was installed during the July 3, 2002 report. Boring B-6 was left open for a single day to measure groundwater prior to backfilling. One day following drilling, groundwater was encountered at a depth of 4.7 feet in all three of these borings (B-1, B-2, and B-6). These measurements correspond to those of reported levels in the area.

To update these levels, Mr. Huber returned to the site on June 18, 2008. The pipes installed in Borings B-1 and B-2 were still present at the site. The groundwater was measured at depths of 4.7 and 5.0 feet in Borings B-1 and B-2, respectively.

3. GEOSEISMIC SETTING

3.1 GENERAL

Utah municipalities adopted the International Building Code (IBC) 2006 on January 1, 2007. The IBC 2006 code determines the seismic hazard for a site based upon 2002 mapping of bedrock accelerations prepared by the United States Geologic Survey (USGS) and the soil site class. The USGS values are presented on maps incorporated into the IBC code and are also available based on latitude and longitude coordinates (grid points).

The structure must be designed in accordance with the procedure presented in Section 1613, Earthquake Loads, of the IBC 2006 edition.

3.2 FAULTING

Based upon our review of available literature, no active faults are known to pass through or immediately adjacent to the site. The nearest active fault is the Wasatch fault approximately 11 miles east of the site.

3.3 SOIL CLASS

For dynamic structural analysis, the Site Class D - Stiff Soil Profile as defined in Table 1613.5.2, Site Class Definitions, of the IBC 2006, can be utilized.

3.4 GROUND MOTIONS

The IBC 2006 code is based on 2002 USGS mapping, which provides values of short and long period accelerations for the Site Class B-C boundary for the Maximum Considered Earthquake (MCE). This Site Class B-C boundary represents a hypothetical bedrock surface and must be

corrected for local soil conditions. The following table summarizes the peak ground and short and long period accelerations for a MCE event and incorporates a soil amplification factor for a Site Class D soil profile in the second column. Based on the site latitude and longitude (41.1170 degrees north and 112.1626 degrees west, respectively), the values for this site are tabulated below:

Spectral Acceleration Value, T Seconds	Site Class B-C Boundary [mapped values] (% g)	Site Class D [adjusted for site class effects] (% g)
Peak Ground Acceleration	36.2	41.2
0.2 Seconds, (Short Period Acceleration)	$S_S = 90.6$	$S_{MS} = 103.1$
1.0 Seconds (Long Period Acceleration)	$S_1 = 35.5$	$S_{M1} = 60.0$

The IBC 2006 code design accelerations (S_{DS} and S_{D1}) are based on multiplying the above accelerations (adjusted for site class effects) for the MCE event by two-thirds ($\frac{2}{3}$).

3.5 LIQUEFACTION

The site is located in an area that has been identified by Weber County as having a “high” liquefaction potential. Liquefaction is defined as the condition when saturated, loose, finer-grained sand-type soils lose their support capabilities because of excessive pore water pressure which develops during a seismic event. Clayey soils, even if saturated, will not liquefy during a major seismic event.

The soils encountered at the site in the borings are predominately clays which will not likely liquefy during the design seismic event.

We appreciate the opportunity of providing this service for you. If you have any questions or require additional information, please do not hesitate to contact us.

Respectfully submitted,

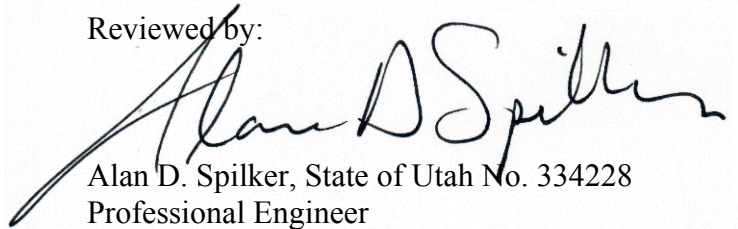
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